

## A Method of Taking a Bird Census

By Professor J. BURTON CLELAND, M.D., University,  
Adelaide.

For some years I have had in view the possibility of obtaining some crude idea of the actual and relative numbers of the individuals of various species of Australian birds by recording those met with during progressive journeys made by various means of locomotion. The idea was that if, whilst walking, driving, or motoring through the country, a score was kept, as one keeps the runs at cricket, on a sheet of paper or the back of an envelope, of the numbers of each species seen, eventually where sufficient ground had been covered results of some value might be expected.

At Easter time in 1917, this scheme took concrete shape at Broken Hill, whilst on a motor run in the country with Dr. W. MacGillivray, R.A.O.U. This journey is recorded as A1 in my series. The desired results were easily and accurately tabulated, and 84 individuals of eight species recorded over a distance of 15 miles traversed in 1¼ hours. The country was mostly open saltbush plain, and the view for small birds estimated at about 100 yards or less, and for large birds about 400 yards. Thirty-three individuals of *Epthianura aurifrons* (the Yellow-fronted Bush-Chat) were counted over the 15 miles with a lateral view of the disturbed birds of about 100 yards on each side—i.e., over an area of roughly a little less than two square miles. One may say, therefore, from the birds actually seen that the density of the population of this species was at least 17 per square mile. Using this as a basis and on the assumption that the rest of the saltbush country of this district was on an average similarly populated, one could by ascertaining the extent of this type of vegetation from the Survey Department, obtain if such was desired a very conservative estimate of the numbers in the district. The figure obtained would evidently be, in this case, surprisingly high.

In an article on "The Birds of the Pilliga Scrub" (*Emu*, vol. xviii., p. 272), I gave details of the method adopted when making a bird-survey of this area. By September, 1919, I had been collecting data for 2½ years, had notes of about 90 "journeys," in which I had traversed over 1200 miles, and it seemed an opportune time to bring the subject under notice at the Annual Conference of the Royal Australian Ornithologists' Union at Brisbane, with the objects of explaining the scheme, of obtaining views as to its reliability and value, of receiving suggestions as to improvements, and of inducing others to co-operate. As the idea seemed to meet with acceptance and some interest, and those who employed the method during the excursions seemed satisfied as to its relative reliability, I have in this paper summa-

rised the observations so far made. As pointed out by others during the discussion, not only is a crude idea obtainable in this way as to the numbers of our birds, but by recording results at the present time and making the same journeys again after, say, some years' interval, some idea might be obtained as to whether any species was decreasing markedly in numbers, holding its own, or increasing. What interesting results might not be obtained a century later!

In my previous paper, which should be consulted, I have indicated clearly how the type of vegetation necessarily affects the extent of the lateral view during the journey. Similarly the size of the bird and its habits, such as not being easily disturbed or *vice versa* will modify materially the distance from the road at which it can be recognised. Thus as regards certain species, such as Magpies, and Black-and-White Fantails, easily recognisable or continually on the move, the results recorded in my tables probably approximate very closely to the actual numbers present in the area under review, whilst in the case of other kinds, such as Tree-Tits (*Smicronis*) and White-plumed Honey-eaters in the tree-tops, the numbers actually seen are doubtless merely a tittle of those which escaped notice. I have given, however, data as regards all birds seen, and we can say, as regards the figures, that at least these numbers were in the area and in many cases probably very many more.

The question may be asked as to the reliability of the identifications. I can lay no claim to infallibility, and am perfectly aware that in my returns some mistakes must have occurred. I have, however, avoided these as far as possible, and when in doubt have expressed this either by a question-mark or by recording the genus only, or by merely noting the birds seen as unidentified. Even with these precautions, however, some wrong identifications have probably been made.

As regards the mode of progression, driving in a buggy or motoring give apparently about the same results, though the advantage is slightly in favour of the former as more time is allowed for observation. When walking, the number of small birds keeping to the trees is increased, as the trees can be carefully scanned, whilst birds calling can be searched for. Some means of progression is, of course, necessary so as to avoid counting the same birds again, and with the same object in view the track of the journey must not interlace. I have, however, in this census considered a return journey over the same ground as two journeys, and have labelled such second journeys (a) and a rare third journey as (b). The object has been to test the reliability of the method. Clearly, if the birds had not left the neighbourhood of the route followed, one should see the same individuals on each occasion if conditions were ideal. My full tabulated list shows that in such return journeys the numbers of species seen and the numbers of individuals of these observed do approximate fairly well on the whole with each other

—certainly as well as one might expect. If such double or triple journeys were lumped as one, it would probably be the correct procedure to consider, as the numbers of birds occupying the area traversed, the highest number for each species seen in any of the journeys, inferring that the lower numbers meant that some individuals had been missed. Another explanation might, however, be forthcoming, namely, that additional birds had entered the area. As far as the results of this census are concerned, we can look upon such out and return journeys as being independent but parallel ones, traversing the same kind of country and corresponding to adjacent "traverses" in a forest survey. It may be thought that during these journeys, birds are disturbed, and, flying in front of the vehicle, may be counted again and again. My experience has been that the birds usually fly off to one or other side rather than in front, and that with ordinary care it is only rarely that the same bird is counted again.

The different districts in which the journeys were made have been indicated by alphabetical letters as follows:—A. Broken Hill district (1); B. Adelaide hills (2 + 1 return journey); C. Sydney district (1); D. Eastern Riverina and South-Western slopes, N.S.W. (6 + 3 returns); E. Western slopes and edge of plains, N.S.W. (6 + 3 returns); F. Moss Vale district to coast, N.S.W. (10 + 2 returns); G. North coast of N.S.W., from Newcastle to Tenterfield—Lismore (24 + 4 returns); H. Scone district (2 + 1); I. Boggabri—Narriabri—Moree, etc. (21 + 5); J. Brisbane district, (1 + 1); K. Dalby district, Q. (1 + 1).

Where a long journey has been made, for instance one of a hundred miles by motor car, this has been split up for convenience into separate journeys of twenty miles or so each, such divisions frequently corresponding with changes in the type of country. Altogether 74 different "routes" have been traversed, giving with the return journeys a total of 95 "journeys." The distance travelled was approximately 1329½ miles. The shortest "journey" was only half a mile, and the longest 60 miles. As these journeys have by force of circumstances been of very uneven length, it would be necessary before attaching the same value to the figures for each journey, to reduce all to a common standard, as, for instance, the number of birds per 100 miles. Obviously space would not permit of this being done here, and, in the case of very short journeys, such a calculation might give far too high a value for the species seen, and would ignore entirely species in the locality which were not seen.

As in some "districts" only one or a few "journeys" have been made, and these perhaps short ones, stress must not be laid on the absence from the census of certain species for such districts. Thus only one short journey is tabulated for the Sydney district. The Magpie-Lark (*Grallina cyanoleuca*), a common bird in the neighbourhood, did not happen to be observed. Had it been seen, this species would have been observed in 9 instead of 8, of the 11 districts.

Turning now to the birds recorded, the value of the records will depend on several factors. It has already been mentioned that some birds, by sitting "tight," give results far below the actual numbers present. Others of migratory habits, such as Bee-eaters (*Merops*) and Wood-Swallows (*Artamus superciliosus* and *A. personatus*) may be seen in numbers or not seen at all according to the time of year. Other species, Water Fowl, for example, are strictly confined to certain types of country. Some species—*e.g.*, Welcome Swallows (*Hirundo neoxena*) are rarely seen away from the habitations of man. Again, a single large flock of birds (*e.g.*, White Cockatoos) seen once on a journey, may give a wrong idea of the distribution of the species when compared with such a widely distributed species as the Black and White Fantail (*Rhipidura leucophrys*) never seen in flocks. To overcome this last difficulty, I have kept a record in my notes, but have not reproduced here, of every instance in which the number of birds seen at one time has reached double figures. The Martins seen in journeys G. 40 (229) and G. 41 (1275) were, for instance, in large groups as follows:—22, 25, 37, 11, 11, 11, 12 and 25, 33, 14, 38, 12, 90, 10, 13, about 150, 136, 40, 10, 18, 75, 250, 177, 31, 15, 30, 36, respectively.

In the 1329½ miles traversed, approximately 160 species of Australian birds and 13,469 individuals of these species were noted. In addition, 1097 Sparrows, 903 Starlings, and 118 Gold Finches were counted.

The most widely and uniformly distributed Australian species was the Magpie-Lark (*Grallina cyanoleuca*), being seen on 80 journeys out of 95 in eight of the eleven districts, the individuals totalling 765. As this is a conspicuous bird, easily identified and easily disturbed, this figure is probably one of the most accurate in the tables. In the districts where it commonly occurs, one would expect to see one of these birds in a little less than every two miles.

Next in wide and uniform distribution comes the Black and White Fantail (*Rhipidura leucophrys*), 317 individuals being seen on 69 journeys in nine districts.

One is glad to see the Magpie—White or Black-back—(*Gymnorhina tibicen* or *G. hypoleuca*) figuring in 66 of the 95 journeys, with 565 individuals. Walking along our roads, we may expect to meet with one of these birds in a little less than every 2½ miles. As this is a conspicuous bird, easily recognised at a distance, the field of vision for it may be considered on an average as being nearly a quarter of a mile on each side of the road—sometimes of course more, but in forest land less. One may therefore estimate that the 1329½ miles over which they were seen comprised an area for vision of about 600 square miles, and that this extent of country was tenanted by at least 565 Magpies, or 1 to a little over 1 square mile. As their distribution is wide and relatively uniform, it is perhaps safe to say that in Eastern Australia (leaving out the drier interior), the

Magpie population is about equal to the area in square miles.

Welcome Swallows (*Hirundo neoxena*), now in great part confined to the neighbourhood of human dwellings, where they can easily find suitable nesting sites, were seen in 58 journeys in ten districts, and numbered 595. It was not possible to separate satisfactorily the Tree-Martins (*Hylochelidon nigricans*) from the Fairy-Martins (*Hylochelidon ariel*). One or other was seen on 49 journeys in eight districts, and the number of individuals counted, 2919, was far greater than for any other species. This was largely accounted for by the great numbers seen resting on the telegraph wires in January, 1918, on a visit to the North Coast of New South Wales.

The field-loving Australian Pipit (*Anthus australis*) was found, to my surprise, in 59 journeys in nine districts, 285 individuals being seen. The Brown Flycatcher (*Microeca fascians*) is also widely distributed, with 237 individuals on 54 journeys in eight districts; 126 Laughing Kingfishers (Jackasses) were seen on 46 journeys in seven districts, being about one bird to every ten miles over the whole distance travelled. These birds often "sit tight," so that a number probably escaped notice. It is probably a conservative estimate to reckon that one Laughing Jackass occupies each five square miles of Eastern Australia.

It is remarkable that only 96 *Acciptriformes* (Hawks, etc. of all kinds) were seen, and these only in 31 journeys in six districts. Though on the routes travelled over they were, with several exceptions, rare birds, it is of course realised that in some districts not visited they are numerous. Nevertheless, one considers the small number seen with some surprise, coupled perhaps with apprehension when the role that many play in vermin-destruction is borne in mind. The figure 96 is probably substantially correct. Even when resting, the birds often perch on a dead tree or other conspicuous place, so that they are not easily missed. Making due allowance, however, for missing a number of Hawks, and reducing the range of vision in consequence to a quarter of a mile on each side, one finds that the population of Hawks is about one for each seven square miles of country.

I do not propose to consider individually any of the other species observed. Readers may draw their own inferences from the tables submitted. The figures as regards many species are necessarily not of much value, owing to the birds being confined to certain specified areas, such as swamps, rivers, dense brush, etc., or being found in large flocks as in the case of Galahs (Rose-breasted Cockatoos). Taken in conjunction with other species, however, they form an interesting record.

Space permits details only of twelve of the commonest species, showing the numbers seen on one journey in each of the eleven districts with the return journey in the last district shown as a check. This table illustrates the method of recording but does not record all the birds seen on a particular journey. The full table is preserved in the R.A.O.U. library, Melbourne.

Table † showing the distribution and numbers of twelve of the most widely distributed birds met with on these journeys

	A1	B2a	C4	D7	E12	F25	G40	H50	I54	J73a	K74	K74a	Districts	Journeys	Total
Miles traversed ...	15	3	1	19	20	19	42	7	16	9	30	30	—	—	1329½
Species of Native Birds	8	16	10	34	22	26	21	20	25	13	28	38	—	—	About 160
Total Native Birds ...	84	39	24	383	204	202	380	120	268	74	275	268	11	95	13,469
Total Hawks, Eagles, &c. ( <i>Accipitriformes</i> ) ...	3	—	—	10	1	—	1	1	22	—	7	5	9	47	133
Rosella ( <i>Platyercus eximius</i> ) ...	—	—	—	—	2	5	—	3	—	—	—	—	—	—	—
Kookaburra ( <i>Dacelo gigas</i> ) ...	—	—	—	2	3	4	—	1	1	—	2	6	7	46	126
Welcome Swallow ( <i>Hirundo neoxena</i> ) ...	—	—	—	—	—	11	64	4	—	11	4	16	10	58	595
Martin (Tree and Fairy) ( <i>Hyoloidon</i> ) ...	—	2	1	—	—	—	—	—	—	—	—	—	—	—	—
Brown Flycatcher ( <i>Microeca fascians</i> ) ...	—	—	—	11	3	—	229	24	70	26	27	26	8	49	2919
Black and White Fantail ( <i>Rhipidura leucophris</i> ) ...	—	2	2	—	2	3	8	—	1	2	2	8	8	54	237
Magpie-Lark ( <i>Gallina cyanoleuca</i> ) ...	—	1	1	3	1	4	6	1	2	—	2	1	9	69	317
Noisy Miner ( <i>Myzantha garrula</i> ) ...	—	—	—	27	26	9	35	6	16	7	16	11	8	80	765
Pipit <i>Anthus australis</i> ...	13	14	—	11	4	1	4	1	—	4	19	26	8	55	793
Crows ...	—	—	—	10	2	5	3	—	4	1	7	5	7	41	168
Magpies ( <i>Gymnorhina</i> ) ...	—	3*	—	57	5	12	3	—	17	—	33	32	8	66	565

\* Under *Gymnorhina* denotes that the species was *G. hypoleuca*, (White-backed) the others being *G. tibicen* (Black-backed).  
† The full table is preserved in the R.A.O.U. Library, Melbourne.